Response to RC #1

Thank you very much for taking the time to review this manuscript and providing constructive comments and suggestions. Please find the detailed point-to-point responses below.

1. Some of this described capability has been explored and tested in multiple JEDI-related scientific publications. I would encourage the authors to do more relevant literature review and to cite these papers where appropriate. It should help complement the current technical focus on this manuscript by supplementing additional scientific validations from others.
Response: Thanks for the comment. Studies from atmospheric composition to meteorological analysis using JEDI framework have been added to Section 2.1.

2. Description and interpretation of some figures and tables is insufficient or irrelevant (please see specific comments below). In several instances, the manuscript simply says JEDI has this capability and then refers to figures or tables, with no further explanatory description or summarization about them. While this manuscript is more technical-focused, an accurate and even short description of included figures or tables would be needed for a scientific publication to enhance readers' understanding.
Response: We have included brief interpretations for the corresponding paragraphs of each figure in the revision.

As JEDI is undergoing rapid development and will be widely used for future research and operations in our community, this manuscript would be a great contribution. Overall, this manuscript is very nicely written and organized. I believe the above comments are easy to address. Therefore, my recommendation to the editor is minor revision (see specific comments as follows).

Specific comments/Technical corrections

- Line 100: Typo: "Model forecasts states" → "Model forecast states"
  Response: It has been revised.
- Section 3.7: Please clarify VIIRS AOD used in this manuscript is NOAA product or NASA product. Because their algorithms are slightly different over the land.
  Response: We use Dark Target and Deep Blue products developed by NASA. The paragraph has been revised for clarity.
- Figure 3: Please add some interpretation for Fig. 3 and be more relevant and accurate. Otherwise, it is not clear why it is included here. Especially, when compared with different obs, the model forecast opposite biases, e.g., slightly positive bias wrt TROPOMI and large negative bias wrt TEMPO. How will this "offers insight into systematic over- or underestimation patterns in time that can inform on atmospheric model process and emission inventory improvements" ? Are comments about whether to show diurnal cycles in TEMPO and TROPOMI around Line 315 reflected in Fig. 3?

Response: A brief interpretation based on the newly added CRMSE figure has been provided for the revision. See L325-332.

- Table 1: Similar comments as Figure 3.
  Response: See response above.
- Line 360: Is VIIRS AOD NOAA/NESDIS product or the NASA product, because they apply different algorithms
  Response: It is the NASA product. See the response to the comment for Section 3.7 above.
- Figure 7, 8 and Table 2: Similar comments as Figure 3. It's not clear why they are suggestive of "This highlights for example the utility of AERONET as a benchmark for both model evaluation and observation operator performance.".
  Response: We revisit the statement and confirm that we cannot conclude it based on the cross-comparison in Figure 7, although AERONET measurements are widely used as the benchmark to evaluate models and validate retrieval algorithms. Therefore, the sentence has been removed. Besides, we have provided more interpretations for the cross-comparison of AOD products in the revision.
- Near Line 410: H(x) is called "observation equivalents", but "model equivalents elsewhere. Please be consistent and use "model equivalents" throughout the manuscript.
  Response: Thanks for pointing out the inconsistencies. It has been updated to "observation equivalents" throughout the revised manuscript.